

NOTES ON GEOGRAPHIC DISTRIBUTION

Insecta, Ephemeroptera, Baetidae: Range extensions and new state records from Kansas, U.S.A.

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The mayfly (Ephemeroptera) fauna of the U.S.A. state of Kansas is relatively poorly documented (McCafferty 2001). With respect to small minnow mayflies (family Baetidae), only 16 species have been documented with published records from Kansas. Those involve *Acentrella turbida* (McDunnough, 1924); *Acerpenna pygmaea* (Hagen, 1861); *Apobaetis Etowah* (Traver, 1935); *A. lakota* McCafferty, 2000; *Baetis flavistriga* McDunnough, 1921; *B. intercalaris* McDunnough, 1921; *Callibaetis fluctuans* (Walsh, 1862); *C. pictus* Eaton, 1871; *Centroptilum album* McDunnough, 1926; *C. bifurcatum* McDunnough, 1924; *Fallceon quilleri* (Dodds, 1923); *Paracloeodes minutus* (Daggy, 1945); *P. dardanum* (McDunnough, 1923); *P. ephippiatum* (Traver, 1935); *P. longipalpus* (Morihara & McCafferty, 1979); and *P. propinquum* (Walsh, 1963) (Traver 1935; Peters 1959; Thew 1959; Liechti 1978; Gray 1989; McCafferty and Lenat 2003; Meyer and McCafferty 2003; Fritz and Dodds 2004; McCafferty et al. 2004).

Traver (1935) misidentified *Callibaetis fluctuans* from Kansas as *Callibaetis montanus* Eaton, 1885, and she reported *Centroptilum album* from Kansas under its junior synonym *Centroptilum walshi* McDunnough, 1929 (Wiersema and McCafferty 2004). Peters (1959) reported *Callibaetis pictus* from Kansas under its junior synonym *Callibaetis centralis* Peters, 1959 (Jacobus and McCafferty 2002). Liechti (1978) contributed most of the past records, and recorded the above species of *Acerpenna*, *Fallceon*, and *Pseudocloeon*, as well as true *Baetis* Leach under the genus name *Baetis*. Based on the extent of known ranges and number of records within Kansas, *Baetis intercalaris* and *Fallceon quilleri* appear to be among the most common baetids in the state, as is a tendency in

other central lowland prairie states as well (McCafferty et al. 2001; 2003; Guenther and McCafferty 2005). Some additionally common species will be evident from the new data we present herein.

Our examination of additional unidentified material of Kansas Baetidae housed in the Snow Museum, University of Kansas, Lawrence, Kansas, and collected mainly by the State Biological Survey of Kansas, has led to the discovery of 19 additional species of Baetidae in Kansas, resulting in a new total of 35 species of Baetidae now known from the state. The records given alphabetically below also represent the first Kansas records of the genera *Camelobaetidius*, *Heterocloeon*, *Plauditus*, and *Procloeon*. Records involve the larval stage of species unless otherwise stated. Pertinent comments on distribution or population variability are given as annotations to the records for some of the species.

New records

- *Acentrella parvula* (McDunnough, 1923).
Atchinson County, Delaware River, 9.66 km south and 1.16 km west of Muscotah, 17-VI-1980, A. Slater;
Ellsworth County, Smoky Hill River, upstream of U. S. Highway 156 bridge, 5-X-1982, P. Liechti, at light (adults);
Kiowa County, Medicine Lodge River, 1.13 km east and 0.64 km north of Belvidere, 30-IV-1978, P. Liechti, D. Huggins (adults).
Comments: Larvae from Atchinson County precisely fit the concept of *A. parvula* and in fact match exactly the description and illustration by Ide (1937). These larvae do not, however, have vestigial hindwingpads, which had been associated with this species by Wiersema (2000).

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A similar variability of having either vestiges of hindwingpads or no hindwingpads occurs in larvae of the more common *A. turbida*. This variability must be taken into consideration when using the most recent key to North American larvae of *Acentrella* by Jacobus and McCafferty (2006), wherein couplet 3 emphasizes the hindwingpad condition, and as a result at least some Kansas *A. parvula* (completely without hindwingpads) do not key out correctly except for the presence of scattered intersegmental banding of the cerci.

• *Acentrella turbida* (McDunnough, 1924).
Cherokee County, Shoal Creek, 2.57 km south of Galena, at state highway 26 bridge, 18,19-V-1079, D. Huggins, and woodland stream, 2.41 km south and 2.41 km east Baxter Springs, 25-V-1982, D. Huggins, P. Liechti.

Comments: Fritz and Dodds (2004) mentioned this species in the context of an ecological study carried out in Kansas. We provide new records here to confirm its presence in Kansas.

• *Camelobaetidius mexicanus* (Traver & Edmunds, 1968).

Coffey County, Neosho River, at Burlington, 16-VI-1976, P. Liechti, D. Huggins;

Geary County, Smoky Hill River, 0.48 km south and 2.09 km east of Junction City, 6-X-1980, P. Liechti, L. Ferrington;

Lyon County, Cottonwood River, below Emporia, 5-VII-1977;

Montgomery County, Verdigris River, south of Coffeyville, 9-VI-1979;

Neosho County, Neosho River, 3.70 km west of St. Paul, at state highway 57 bridge, P. Liechti.

Comments: This species is also known from Oklahoma and Texas (Reisen 1975; Lugo-Ortiz and McCafferty 1995), but is most common in Mexico (Randolph and McCafferty 2000) and ranges as far north as Idaho and Oregon in the western United States (Lester et al. 2002; Meyer and McCafferty 2007).

• *Camelobaetidius waltzi* McCafferty, 1994.

Allen County, Neosho River, 1.16 km west of Iola, 30-VII-1980, D. Huggins;

Cherokee County, Neosho River, between low-water bridge at Chetopa, 21-IX-1978, D. Huggins;

Coffey County, Neosho River, at Burlington, 16-VI-1976, P. Liechti, D. Huggins;

Cowley County, Walnut River, northeast of Arkansas City, 8-VI-1979;

Douglas County, Kansas River, at Lecompton, 21-IX-1982;

Geary County, Smoky Hill River, 0.32 km south and 2.09 km east of Junction City, 6-X-1980, P. Liechti, L. Ferrington;

Labette County, Neosho River, below dam at Riverside Park, Oswego, 2-VIII-1976, S. Hamilton;

Marion County, Cottonwood River, at Marion, 23-VI-1978, and Cottonwood River, Wedge Marion, Section 6, T20S, R4E, 30-VIII-1979, D. Huggins, P. Liechti;

Neosho County, Neosho River, 3.70 km west of St. Paul at state highway 57 bridge, 20-IX-1978, D. Huggins, and 1-X-1978, P. Liechti.

Comments: Kansas records are now the most extensive representation known for this central North American species, which is reported only from relatively few records in Indiana, Iowa, Nebraska, and Texas (McCafferty and Klubertanz 1994; Klubertanz and Jones 1999; Wiersema and McCafferty 1999).

• *Centroptilum minor* (McDunnough, 1826).

Douglas County, Reservoir, near bird survey, west campus of University of Kansas, Lawrence, at light, 11,12-IX-1980, L. Ferrington (adults).

Comments: This species has been known from the adjacent states of Missouri and Oklahoma (McCafferty et al. 2004; Baumgardner and Kennedy 1999), but also nearby Texas (Wiersema and McCafferty 2004), as well as southeastern and northeastern regions of North America (McDunnough 1926; Jacobus and McCafferty 2001a; McCafferty et al. 2004; Wiersema and McCafferty 2004; Chandler et al. 2006).

• *Centroptilum semirufum* McDunnough, 1926.

Cheyenne County, South Fork Republican River, 17.70 km west and 11.26 km south of St. Francis, 5-VI-1979, D. Huggins, P. Liechti.

Comments: The known range of this poorly known species is considerably extended with its discovery in the extreme northwest corner of Kansas. It previously was known only from northeastern North America, where it had not been reported west of Ontario or Pennsylvania (Jacobus and McCafferty 2001a; b; McCafferty and Randolph 1998).

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- *Centroptilum triangulifer* (McDunnough, 1931).
Douglas County, Lawrence, at light, 29-IX-1981, A. Slater (adults);
Wilson County, spring-fed ravine, N .25, W .25-Section 11, T28S, R13E, 1V-1983, P. Liechti.
Comments: This is a westernmost record of this species in North America (Wiersema and McCafferty 2004).
- *Heterocloeon frivolum* (McDunnough, 1925).
Cherokee County, Shoal Creek, south edge of Galena, 20-VI-1979, D. Huggins, P. Liechti.
- *Heterocloeon grande* (Wiersema & Long, 2000).
Chase County, Rock Creek, 1.61 km west and 0.48 km south of Bazaar, state highway 177, 20-V-1976, P. Liechti, D. Huggins;
Comanche County, Calvary Creek, 11.67 km south of Protection, 18-III-1982, B. Coler;
Greenwood County, Fall River, 7.24 km north and 0.80 km west of Climax at state highway 99 bridge, 29-V-1980, P. Liechti, D. Huggins;
Kiowa County, Rezeau Ranch (Range 16 W, T29S, Section 15, south half, 8.85 km north and 0.80 km east of Belvidere, 19-III-1982 (adult) and 5-III-1983 (larva), J. Gelhaus, and Medicine Lodge River, 0.80 km north of Belvidere, 13-I-1981, P. Liechti;
Pottawatomie County, Red Vermillion River, state highway 16 bridge, 1.13 km south and 1.13 km east of Onega, 28-IV-1978, P. Liechti, D. Huggins;
Sumner County, Chikaskia River, 0.16 km west of Drury, 20-III-1981, M. Moffett.
Comments: This species was previously known only from Rutherford and Williamson Counties in Tennessee (Wiersema and Long 2000). We found subtle differences in the characterization of the Kansas populations. These differences include the larval cerci banding being at midlength rather than slightly distad of midlength; minor, expected variation in the dorsal abdominal patterning; variation in the length of the reduced median caudal filament; gills that are slightly asymmetrical in shape, with gray tracheation; and the presence of lateral tracheation on abdominal sterna. The male adult we associate with this possible Kansas variant of the species was generally similar to that described for *H. grande*, and it was taken at the same locale (Rezeau Ranch, Kiowa County) and in the same month of

March as a mature larva. This adult also has lateral tracheation on abdominal sterna, matching that of the larval variants.

- *Plauditus cestus* (Provost & McCafferty, 1982).
Sheridan County, South Fork Solomon River, 0.48 km northeast of Tasco, 7-V-1975, D. Huggins.
Comments: One male larva demonstrates the typically short antennae (subequal to head capsule) and highly attenuate vestigial median caudal filament, but also represents a newly discovered abdominal banding variant not previously discussed by Lugo-Ortiz and McCafferty (1998) or McCafferty and Jacobus (2001). Its abdominal tergum 1 is solidly dark banded whereas tergum 5, which has been most commonly noted as being distinctly banded in *P. cestus* larvae, is only moderately darker than other abdominal terga (possibly somewhat faded). Femoral patterning is undecipherable (probably due to fading); however, there is apparent in this specimen a prominent anteromedial, somewhat V-shaped marking on abdominal tergum 2 previously thought to be present only in *Plauditus gloveri* (McCafferty and Waltz 1998; McCafferty and Jacobus 2001). We have also seen a similar marking in some *Plauditus punctiventris* larvae from Kansas.

- *Plauditus dubius* (Walsh, 1862).
Kiowa County, Thompson Creek, 6.44 km northwest of Belvidere, 15-III-1983, L. Herrington (adults and larva);
Riley County, North Fork King's Creek, Konza Prairie, at Jewell Spring outlet, 26-VII-1979, A. Slater, and at 18 m below Fiss Spring, 27-V-1981, J. Gelhaus;
Waubonsee County, South Branch Mill Creek, 14.08 km west and 3.22 km north of Eskridge, 28-V-1981, J. Gelhaus.

- *Plauditus gloveri* McCafferty & Waltz, 1998.
Waubonsee County, South Branch Mill Creek, 3.22 km north and 14.48 km east of Eskridge, 11-VI-1980, J. Gelhaus.

- *Plauditus punctiventris* (McDunnough, 1923).
Atchison County, unnamed tributary of Nebraska Creek, 2.25 km south and 9.82 km east of Larkinburg, 15-V-1984, B. Coler, D. Huggins;

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Chase County, Mercer Creek, 1.29 km south and 0.32 km east of Matfield Green, 15-IV-1982, P. Liechti;

Douglas County, Washington Creek, below Lone Star Lake, IX-1973, D. Huggins;

Jackson County, South Cedar Creek, 0.97 km south and 6.60 km east of Mayetta, 21-IV-1982, P. Liechti;

Pottawatomie County, Wilson Branch Creek, 3.22 km west of Westmoreland, 12-IV-1982, P. Liechti;

Woodson County, intermittent stream, northeast quarter of Section 6, T26S, R15E, 12-V-1983, P. Liechti.

Comments: Kansas larval populations of this species that we examined included some mature males that possess the exact dorsal abdominal pattern and in some of those the ventral spotting associated with the male adult type of *Pseudocloeon myrsum* Burks, a junior synonym of *P. punctiventris* (McDunnough) (Figure 20, McCafferty et al. 2005). Determination of the larval stage of this species is now problematic because the larval description given under the name *P. punctiventris* by Ide (1937) was shown definitively by McCafferty and Meyer (2007) to be applicable to *Heterocloeon anoka*. In addition, what we consider *P. punctiventris* are sexually dimorphic as larvae, as are *P. dubius*, *Plauditus texanus*, and *Plauditus virilis*, for example, whereas those of *H. anoka* are not.

• *Plauditus texanus* Wiersema, 1999.

Kowa County, Rezeau Ranch spring-fed creek, 19-III-1982, B. Coler;

Sumner County, Ninnescah River, 3.22 km south of Belle Plaine, 6-V-1980, K.D.H.E.;

Waubonsee County, Rock Creek, 8-VI-1973, Rickett, Lessender, Drenner.

Comments: This species was previously known only from Texas and Oklahoma (Wiersema 1999; McCafferty et al. 2004). It demonstrates a common tendency among mayfly species of Texas and Oklahoma also to range into Kansas.

• *Plauditus virilis* (McDunnough, 1923).

Barber County, Elm Creek, 12.07 km north and 2.41 km west of Medicine Lodge, at highway 281, 4-III-1983, B. Coler, and North Elm Creek, 19.31 km north and 11.26 km west Medicine Lodge, 22-VI-1978, S. Hamilton;

Chase County, Northwest quarter of Northeast quarter, Section 34, T21S, R9E, 14-V-1980, K.D.H.E.;

Chautauqua County, Big Caney River, 2.41 km west of Elgin, 28-V-1980, P. Liechti, D. Huggins; Elk County, Elk River, 2.25 km south and 2.41 km west of Howard, 28-V-1980, P. Liechti, D. Huggins;

Johnson County, Cedar Creek, 4-V-1979, P. Liechti;

Kingman County, Chikaskia River, 3.22 km west of Spivey, 6-IV-1980, S. Hamilton;

Pratt County, Ninnescah River, 0.80 km north of Cairo, 12-I-1981, P. Liechti;

Riley County, Deep Creek, 5.64 km south and 9.66 km east of Ashland, 30-VI-1982, P. Liechti, P. Huggins, and North Fork Kings Creek, below Fiss Spring, Konza Prairie, 26-VII-1979, A. Slater.

Comments: This widespread North American species appears to be relatively common in Kansas.

• *Procloeon rubropictum* (McDunnough, 1923).

Cherokee County, Spring River, at state highway 96 bridge, 12-VIII-1982, B. Coler, D. Huggins;

Geary County, Smoky Hill River, 2.41 km east of Junction City, 19-VI-1979, K.D.H.E.;

Linn County, Buck Creek, 6.28 km west and 1.13 km south of Mound City, 8-VI-1983, P. Liechti, D. Huggins, A. Brigham.

• *Procloeon rufostriatum* (McDunnough, 1924).

Chautauqua County, Caney River, near state highway 99 bridge, Cedar Vale, 15-VI-1977, S. Hamilton (adults);

Cherokee County, Spring River, at Highway 96 bridge, 1-VIII-1982, B. Coler, D. Huggins.

• *Procloeon texanum* McCafferty & Provonsha, 1993.

Lawrence County, West Campus, 15-IX-1982, P. Liechti, JAS (larvae and reared adults).

Comments: The species has been known previously only from Texas and Oklahoma (McCafferty and Provonsha 1993; Baumgardner and Kennedy 1999).

• *Procloeon viridoculare* (Berner, 1940).

Douglas County, Deer Creek, 0.64 km south of Stull, 2-IX-1981, L. Ferrington;

Elk County, Big Caney River, 1.61 km west of Grenola, at U. S. Highway 160 bridge, 12-V-1982, B. Coler, D. Huggins;

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Franklin County, Apanoosie Creek, 4.83 km east and 4.83 km north of Pomona, 27-IX-1997, A. Schuster;
Saline County, Smoky Hill River, at New Cambria, 2-V-1978, K.D.H.E.;
Shawnee County, Shunganunga Creek, southwest quarter, Section 35, T11S, R16E, 24-VI-1980, K.D.H.E.;
Washington County, Little Blue River, 14.48 km east of Washington, on state highway 36, 10-VI-1976, T. Oldham, and Mill Creek, at roadside park on east edge of Washington, 24-VI-1975, P. Liechti.

Comments: This species appears to be the most common of the long-clawed baetid larvae in Kansas, which are thus far confined to the genera *Centroptilum* and *Procloeon* in that state.

• *Procloeon* sp. 1.

Russell County, Saline River, at county road, 5.64 km north of Russell, 12-VI-1978, G. Hamilton;
Saline County, Smoky Hill River, at New Cambria, 2-V-1978, K.D.H.E.

Comments: This is a distinctive, undescribed species that had previously been known only from the Ouachita Mountain area of Arkansas.

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